

### **REMARKS/ARGUMENTS**

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1 and 3-5 are pending in the present application. Claim 1 is amended by the present amendment without an introduction of any new matter.

In the outstanding Office Action, Claims 1 and 3-5 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner states that the steps without incorporating a deasphalting treatment and without mixing a hydrogen donor stream is subject matter that was not described in the specification at the time the application was filed. Amended Claim 1 now does not recite the phrase the Examiner cited. Accordingly, withdrawal of the outstanding rejection of Claims 1 and 3-5 under the first paragraph of 35 U.S.C. §112 is respectfully submitted to be in order.

Claim 1 is further amended to recite “a step of thermally cracking the heavy oil content obtained directly from a bottom of the distilling section *so that a lightened thermally cracked product and residues of pitch or coke are produced.*” The specification at page 11, lines 4-11 provides support for this recitation of amended Claim 1, and describes as follows:

The heavy oil content 15 (vacuum residue (15)) separated at such step of separating a crude oil by distillation where the distilling section 10 is used and obtained substantially from the bottom of the distilling section 10 is introduced to the thermal cracking section 20, in which the heavy oil content 15 is thermally cracked and separated into a lightened thermal cracking product 21 and a thermal cracking residue 25 (the step of thermal cracking).

The specification at page 12, lines 12-19, for example, provides additional support for the above recitation of amended Claim 1, and describes as follows:

In the above-mentioned thermal cracking section 20, the raw material for thermal cracking is generally pre-heated or, in some cases, pre-cracked at a tube-type heating furnace, followed by further thermal cracking by

means of a reactor of vessel-type (EUREKA, delayed coker) or fluid bed-type (flexicoker, fluid coker) to form thermal cracking products such as a cracked gas and a cracked oil, and residues such as pitch and coke, which are separated from each other.

The Applicants respectfully submit that the present application, with Claim 1 being amended as noted above, is now in condition for formal allowance. It is noted that amended Claim 1 is believed to be clearly distinguishable from the previously cited reference Friday et al. (U.S. Patent No. 6,183,627).

In this last regard, the present invention as recited in amended Claim 1 includes a step of thermally cracking the heavy oil content *so that a lightened thermally cracked product and residues of pitch or coke are produced*. Because the present invention positively produces residues such as pitch and coke without any problems (e.g., plugging and fouling), the present invention does not include processes such as deasphalting treatment and mixing a hydrogen donor stream.

Contrarily, the process of Friday et al. does not include any step so that the residues such as pitch and coke are produced. In the process of Friday et al., asphaltenes contain large molecules of hydrocarbon, which are precursors to be converted to the residues such as pitch and coke. Because the conversion of the precursors to the residues causes a variety of problems (e.g. plugging and fouling), Friday et al. utilize the deasphalting treatment and hydrogen donor stream to suppress the conversion of the precursors to the residues in the thermal cracking process. Accordingly, the process of Friday et al. does not positively produce the residues during the thermal cracking process, but send the precursors before converted to the residues to the deasphalting treatment for removal.

Further in this respect, Friday et al. were acknowledged in the Office Action dated October 28, 2004 as failing to disclose or suggest "... a step of thermally cracking the heavy

oil content obtained directly from a bottom of the distilling section into a lightened thermally cracked product” (see page 3, last paragraph, of the Office Action). This Office Action then stated that “[I]t would have been obvious to one having ordinary skill in the art ... to eliminate the solvent deasphalting step of Friday ... because the elimination of a step along with its function has been held to be *prima facie* obvious” (see page 4, first paragraph, of the Office Action).

However, Applicants respectfully submit that one skilled in the art would not have been *motivated* to eliminate the solvent deasphalting from the process of Friday et al. for the reasons fully set forth in the January 28, 2005 response to the action that are repeated as follows:

For example, a brief review of Friday reveals that one of the purposes of the Friday’s process is to produce a substantially asphaltene-free, and metal-free distillate stream from a heavy hydrocarbon feed stream *by solvent deasphalting* the feed (see column 2, line 66 to column 3, line 3). Accordingly, the solvent deasphalting is *necessary* in the Friday’s process to realize a production of a substantially asphaltene-free, and metal-free distillate stream from a heavy hydrocarbon feed stream.

Further, if a modification to eliminate the solvent deasphalting is attempted, such modification would render the Friday’s process unsatisfactory for its intended purpose of producing a substantially asphaltene-free, and metal-free distillate stream from a heavy hydrocarbon feed stream. More specifically, such modification would, in effect, render the Friday’s process unable to produce a substantially asphaltene-free, and metal-free distillate stream from a heavy hydrocarbon feed stream since the step of solvent deasphalting, which is *necessary* to achieve such production, is eliminated from the process.

Accordingly, there is no evidence that one skilled in the art would be *motivated* to perform such modification to the Friday’s process. Note that M.P.E.P. 2143.01 states “[i]f a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Therefor, the present invention recited in Claim 1 and Claims 3-5 which depend from Claim 1 is clearly distinguishable from Friday et al.

Similarly, Claim 1 is believed to define over Boyer (U.S. Patent No. 4,332,671) for the reasons set forth in the January 28, 2005 response that are repeated as follows:

With respect to Boyer, as acknowledged in the Office Action, Boyer fails to disclose or suggest "... said distillate oil is collectively introduced into a hydrotreating section without separating into each content having prescribed boiling range and is collectively subjected to desulfurization, cracking and hydrogenation treatment" (see page 5, second paragraph, of the Office Action). The Office Action then states that "[I]t would have been obvious to one having ordinary skill in the art ... to have modified the process of Boyer by collectively introducing the distillate oil into the hydrotreater without separating the oil into each content having a prescribed boiling range because all fractions in the Boyer process are sent to the same hydrotreater" (see page 5, last paragraph, of the Office Action).

However, Applicants respectfully submit that one skilled in the art would not have been *motivated* to perform such modification to the Boyer's process for the following reasons.

Initially, as stated at page 10, line 26 to page 11, line 3 of the specification of the present application, one of the benefits derived from having a distillate oil collectively introduced into a hydrotreating section without separating into each content having prescribed boiling range is that large-scale atmospheric distillation apparatuses become unnecessary.

Turning to Boyer, Boyer discloses that a feedstock is fed to an atmospheric pressure crude distillation unit 12 through a line 10, and naphtha, distillate and gas oil products are *separately* drawn from the atmospheric distillation unit 12 through lines 22, 24 and 26, respectively (see the Figure, and column 2, lines 30-48). That is, the naphtha, distillate and gas oil products are *separated* into each content. Then, the naphtha, distillate and gas oil products are *separately* fed to a desulfurization unit 28, from which low-sulfur naphtha, distillate and gas oil are drawn *separately* through lines 30, 32, and 34, respectively. In summary, the naphtha, distillate and gas oil products drawn from the atmospheric distillation unit 12 are desulfurized *separately* in the desulfurization unit 28 and drawn as the low-sulfur naphtha, distillate and gas oil from the desulfurization unit 28 *separately*.

However, there is absolutely no evidence of suggestions of collectively introducing naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range. More specifically, Boyer does not even

address any benefits of collectively introducing naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range as compared to simply introducing naphtha, distillate and gas oil products *separately* into the desulfurization unit.

Further, it is unclear whether the atmospheric distillation unit 12 of Boyer would actually be able to collectively introduce naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range.

Accordingly, there is no evidence that one skilled in the art would be *motivated* to collectively introduce naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range.

Moreover, Applicants respectfully submit that the method of Claim 1 is completely different from an old paradigm, e.g. the Figure of Boyer, in which a crude oil is first separated into multiple products, treated with reactions and then finished into respective products.

For example, the method of Claim 1 provides a new paradigm in which a step of refining is provided to common reactions, e.g., residue cracking and distillate hydro-processing, followed by separating into products. This new paradigm brings about a large cost reduction, for example, by including, among other things, a crude pre-separation having a single product stream for distillate, instead of multiple streams of the old paradigm of Boyer.

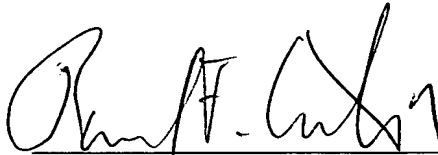
Applicants further note that the crude oil *is not separated* by distillation into several distillate oil fractions at a distillation section which includes a pre-separating apparatus and a vacuum distillation apparatus as a main separating apparatus. That is, the method of Claim 1 states that “the crude oil is separated by distillation into *a* distillate oil and *a* heavy oil content.” The term “*a* distillate oil” corresponds to a collective group product which contains a vacuum gas oil content, a gas oil content, a kerosene content and a naphtha content, *without separating into each content having prescribed boiling range*. For example, the method of Claim 1 differs from Boyer in that the crude oil is separated by distillation into *a* distillate oil and *a* heavy oil content, and the distillate oil separated in the distilling section contains a vacuum gas oil content, a gas oil content, a kerosene content and a naphtha content, and these contents are collectively introduced to a hydrotreating section *without separating into each content having prescribed boiling range*.

Therefor, the present invention recited in Claim 1 and Claims 3-5 which depend from Claim 1 is believed to define over Boyer.

As no other issues are pending in this application, it is respectfully submitted that the present application is now in condition for formal allowance, and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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